SCOPE OF WORK
Butte Creek Revegetation and restoration assessment project

Submitted to the
Anadromous Fish Restoration Program (AFRP)
of the
U.S. Fish and Wildlife Service (USFWS)
by the
CSU, Chico Research Foundation
on behalf of
the Watershed Projects at CSU, Chico

1. Scope of the Project:

This project will develop a unified management plan designed to protect, restore, and enhance approximately 4 miles of prime migratory, holding, and spawning habitat for the threatened spring-run chinook salmon, fall-run chinook salmon, and the federally-listed threatened steelhead trout. Additionally, the area is a migration and nesting area for threatened avian species including the bald eagle, Swainson's hawk, and numerous species of neotropical migrant birds. The proposal will be carried out in 3 phases: 1) revegetate a 1,000 foot section of rip-rap; 2) coordinate a pilot study investigating a methodology for establishing riparian vegetation on cobble fields to be coordinated by restoration ecologist Thomas Griggs, Ph.D.; and 3) develop a comprehensive restoration plan for the entire 4-mile reach of Butte Creek utilizing information derived from the cobble field revegetation pilot study, a *Stream Evaluation Program* being conducted by the California Department of Fish and Game (CDFG), the in-progress Fluvial Geomorphology Study partnering CSU, Chico and Matt Kondolf, Ph.D., and a review of the property management plans already developed by CDFG and CSU, Chico.

Development of a comprehensive restoration strategy will provide a framework for cooperative and unified management of the reach of Butte Creek that includes properties owned and/or managed by CSU, Chico and DFG. The restoration implementation plan will emphasize fish and wildlife species and their habitats, including shaded riverine aquatic (SRA) habitat, cottonwood and oak riparian habitats, blue oak woodland habitat, mixed chaparral habitat, and annual grassland habitat. Additionally, management will provide limited, improved public access along the corridor. Management issues such as control of non-native species, restoration of impacted habitats, and use of the properties as educational resources will be addressed with a partnership approach. Finally, the pilot study investigating a methodology for establishing riparian plants on existing cobble fields left over from historic hydraulic and gravel mining will be applicable for restoration of cobble fields on other Central Valley streams (e.g., Yuba River, Tuolumne River, etc.).

The location of the project is the Butte Creek watershed, Butte County. The specific location is approximately 2.5 miles southeast of the City of Chico in the lower canyon reach of Butte Creek. The Butte Creek Ecological Preserve consists of three semi-contiguous units (Honey Run Unit, Canyon Unit, Virgin Valley Unit). In December 1998, the CSU, Chico Research Foundation purchased the 90+ acre Honey Run Unit from willing seller John McAmis. Historically, this site was mined for gravel and then went through several planned development phases including a sixteen-lot split to a final approved subdivision of four exclusive lots with extensive roads and development. The Virgin Valley Unit and the Canyon Unit are owned by DFG and have recently been placed into joint management responsibility between DFG and CSU, Chico through a Memorandum of Understanding (MOU). Due to budgetary constraints, DFG has limited maintenance or enhancement funds for these properties. The three Units total

approximately 375 acres. The reach of Butte Creek just upstream of the Parrott-Phelan diversion structure has extensive riprap material (approximately 3,800 feet) placed along the banks. Additionally, this section of stream is also the location of the Parrott-Phelan and Durham Mutual Diversion Dams (two agricultural structures that were recently upgraded with high flow fish ladders and screens). Both M&T Ranch and Durham Mutual Water Company support the project objectives and will be involved in implementation. *A collaborative restoration assessment addressing the needs of these ecological reserve properties, the instream diversion structures, and flood control measures will benefit the myriad beneficial uses along this reach of Butte Creek.*

2. Benefits of the Project:

Butte Creek is an important resource that supports several priority species and habitats. Within the Central Valley, spring-run chinook salmon, fall-run chinook salmon, and steelhead trout and their associated aquatic and shaded riverine aquatic habitats have been in decline for many years. Butte Creek contains 20+ miles of critical spawning and holding habitat for all three of these species, which have been listed or recommended for listing under both the California and Federal Endangered Species Acts. The key to sustaining and restoring healthy populations of these fish is protecting and restoring the habitats upon which they depend. DFG has determined that the Butte Creek Ecological Preserve has extreme value in terms of providing wildlife habitat and protection of critical shaded riverine and aquatic resources.

Project staff will seek funds from <u>other sources</u> to investigate exotic vegetation removal methodologies on these sites. Strategies for removing exotics go hand-in-hand with revegetating an area with ecologically beneficial native species. The control of exotic species of vegetation will have extremely beneficial biological benefits for fish and wildlife. Invasive exotics have the ability to change community structure (species composition) as well as community function (i.e., nutrient cycling). In fact, many invasive species are capable of supplanting an array of species, thus creating a monospecific stand and decreasing biodiversity. If these monospecific stands do not replace the functional role of the displaced species (i.e., food source, nesting habitat, shade), additional habitat is lost. The plant community in the Butte Creek watershed that is most susceptible to invasive species is the riparian community. The restoration of a resilient native riparian habitat along this reach of Butte Creek will have high habitat value for fisheries (erosion control, water temperature moderator, basis of food chain) and wildlife (nesting sites, breeding sites, prey refuge, etc.). Investigations of exotic removal strategies will benefit the project when developing the comprehensive restoration strategy for this 4-mile reach.

The project proposal supports several actions and evaluations for Butte Creek found in the USFWS *Revised Draft Restoration Plan for the Anadromous Fish Restoration Program*. This project will develop and demonstrate collaborative strategies of channel and floodplain management, resulting in improvements for riparian plant species and water quality that would help to cool the stream, filter urban runoff, capture large woody debris, and increase water storage and groundwater recharge capabilities. The proposal provides other benefits including water quality, water storage, water temperature, and public education. Grassroots involvement will help to develop a stronger sense of stewardship for these areas. The unified partnership of CSU, Chico, the County of Butte, the partnerships with local conservation groups, and/or residents of Butte Creek canyon will ensure that the long-term management of the Butte Creek Ecological Preserve will be self-sustaining. These entities are dedicated to utilizing new information and applying it to adaptive management strategies for better preserving Butte Creek's resources.

Current efforts on Butte Creek that provide synergy for this comprehensive restoration project are directed towards reduction of entrainment of salmonid juveniles, increased instream flows, improvement of adult anadromous fish passage, and protection of riparian habitat. In 1996, the Conservancy initiated and

circulated a MOU to local, state, and federal agencies and other interested parties that focused on seeking cooperative solutions to restore and protect chinook salmon in Butte Creek. The Conservancy, working with the CSU, Chico Research Foundation, is developing a Watershed Management Strategy, central to which will be the enhancement and protection of Butte Creek's natural resources.

Watershed Projects at CSU, Chico is currently managing a project at the Virgin Valley Unit just upstream of the Highway 99 crossing of Butte Creek. Working closely with Durham Mutual Water Company and Baldwin Construction on recreational concerns (i.e., access, signage, infrastructure), Watershed Projects is also involved in a limited revegetation effort. The planned 1-acre revegetation effort is meant to serve as a highly visible demonstration site for combating the growing star thistle problem.

In addition to the efforts of local conservation groups and CSU, Chico, the agricultural community has undertaken substantial restoration activity. As a result of the M&T pump relocation on Big Chico Creek, a component of the project was an agreement to modify diversions from Butte Creek during certain key months to protect anadromous fish in Butte Creek. Under the agreement, up to 40 cfs of flow will be left in Butte Creek from October 1 through June 30 of each year. During 1994, the first fish screen on a Butte Creek diversion was installed at the Parrott-Phelan Diversion. Following installation of the fish screen in 1995, a new and improved fish ladder was constructed. During 1997, an inverted siphon was constructed under Butte Creek to convey flows delivered from the Feather River to the Western Canal Water District, initiating the removal of four additional agricultural structures. Three additional diversion dams (Durham Mutual, Adams, and Gorrill) along the valley reach of Butte Creek have been retrofitted with new fish screens and fish ladders.

Another USFWS-funded effort within the watershed is the Keeney Project. This project intends to restore 56 acres of almond orchard, located between the levees of Butte Creek near the Midway, to shaded riverine aquatic and native riparian habitat. The Center for Natural Lands Management has purchased the land and is managing the restoration effort utilizing a nursery stock of native plants from sources local to the site. Some of this native nursery stock may be used to help revegetate areas in the Butte Creek Ecological Preserve.

Another significant effort is underway in the lower part of the Butte Creek system. Ducks Unlimited, Inc. and the California Waterfowl Association, with funding from the CVPIA Anadromous Fish Restoration Program, are working with local landowners along the lower reaches of Butte Creek to initiate a program to improve fish passage through the Butte Sink and Sutter Bypass. All of these collaborative planning and implementation projects are geared towards easing the inmigration and outmigration of anadromous fish through the Butte Creek system. The objectives of this proposal are meant to provide these species with prime migrating, holding, and spawning habitat once they have circumvented and overcome the numerous natural and anthropogenic stressors found in the ocean, the Delta, the Sacramento River, and the valley section of Butte Creek.

3. Monitoring and Data Evaluation:

The objective of this proposal is to create a comprehensive management plan to restore native biological communities and natural processes along this severely impacted reach of Butte Creek. Certain tasks (see Table below) will require monitoring of either revegetation (planting) success or the results of experimental manipulations. For example, the revegetation of the 1,000 feet of riprap (Phase I) will be monitored for both horticultural success, as percent survival of installed cuttings, and for the proportion of the rip-rapped bank that is covered by these survivors as a measure of the potential SRA habitat restored. The cobble-field restoration feasibility study (Phase II) will require careful and timely visits by the monitor to quantify flows, depths,

seedling establishment, and growth. Prior to commencing on work that requires biological monitoring, the Watershed Office will prepare a Biological Monitoring Plan (BMP) incorporating a Quality Assurance Project Plan (QAPP) which will be submitted to the Service for review and approval. Whenever possible, standard methods will be incorporated and referenced in the plans.

Biological /Ecological Objectives			
Hypothesis/Question to be Evaluated	Monitoring Parameter(s) and Data Collection Approach	Data Evaluation Approach	Comments/Data Priority
Phase I. Revegetation of RipRap. Task 1. Develop Plan			Revegetation Plan for rip-rap
Phase I. Task 2. Implement Plan	Survival by species	Percent survival; Percent of linear rip-rap with living plants	
Phase II. Task 1. Pilot Study to Develop Methods for Cobble-Field Restoration	Flows; depths at time of seed-fall; establishment and growth of seedlings	Survival by species relative to flows, elevation above channel, and substrate	Final report
Phase III. Comprehensive Restoration Strategy and Plan. Task 1. Compile Plan	Survey of specific reports	Specific locations for restoration of vegetation, removal of exotics, flood control	Completion of pilot studies is paramount

4. Work to be Performed and Deliverables:

Phase I – Revegetation of Extensively Rip-Rapped Areas.
Scheduled Timeframe: April 2000 – September2000

Task 1 – During the high flows of the 1997 floods, Butte Creek reclaimed an old channel leaving a stretch of the old stream channel (site of an important agricultural diversion) dry and placing a major housing development in jeopardy of future flooding. Butte County's Office of Emergency Services, under the NRCS *Emergency Watershed Program*, excavated and returned Butte Creek to its former channel and stabilized three separate sites with approximately 3,800 feet of rip-rap. Limited funds are available for revegetating these sites and currently the areas remain predominantly devoid of vegetation. The first task of this phase of the project is developing a revegetation plan specific to initiating riparian plant cuttings along a 1,000 foot stretch of the 3,800 feet of rip-rap material. This plan will be developed early in year one of the project. Funding has been allotted through this proposal should CEQA/NEPA or other permitting be required for the work described above.
Deliverable: *Rip-rap Revegetation Plan – June 2000*

Task 2 – In cooperation with the Butte County Office of Emergency Services and other local conservation efforts, CSU, Chico will collect and purchase cuttings and seed stock from the Butte Creek Ecological Preserve, CSU, Chico University Farm, and through native plant funding programs. Butte County has allocated approximately $12,000 towards the revegetation project. These monies will be used to purchase and collect plants, soil, and irrigation equipment. The goal is to provide approximately 1,500 plants or cuttings. When the 1,000 feet of rock material are planted with the 1,500 plants, there will be approximately one to two trees or shrubs per linear foot of rip-rap. CSU, Chico will coordinate Americorps

workers, CSU, Chico students and wherever possible, volunteers in the revegetation effort. Import of soil and development of an irrigation system are necessary for site-specific areas that are not connected to the water table. Irrigation design is site and budget dependent, and will be developed with oversight from Restoration Ecologist Tom Griggs. This is an extremely novel approach to establishing vegetation on an existing area of rip-rap. It will be a useful demonstration of its value to other projects in the Sacramento Valley. The initial revegetation of the 1,000 feet of rip-rap will be completed in the first year of this project. Irrigation, monitoring, and potential follow-up planting will continue in year 2 of the project. In addition, based on the success of this revegetation effort and the continued financial support of USFWS and the County of Butte, the final 1,800 feet of rip-rap will be revegetated in year two of this project.
Deliverable: *Revegetation of 1,000 feet of previously barren, rip-rapped streambank – September 2000*

Phase II - Develop a Report with a Quantified Prescription for Cobble-Field Restoration and Management

Scheduled Timeframe: April 2000 – March 2002

Task 1 – Initiate a pilot study to determine the best methods to encourage capture of native tree and shrubs seeds (Fremont cottonwood, arroyo willow, Sandbar willow, white alder), their germination and their growth as SRA habitat on cobble-fields left over from historic mining activities. At the Honey Run Ecological Preserve, under the supervision of restoration ecologist Thomas Griggs, Ph.D., an excavator will be used to create bays within the cobble-field and small terraces along its edge where naturally dispersed seed will fall. The number of these bays will be determined by landscape and budget constraints. Careful monitoring of flows and elevations of water surface at the times of seed dispersal, seed germination, and the rate at which the flows decline over the summer will result in a quantified prescription for manicuring cobble fields to promote their revegetation. Studies similar to this have been carried out on the Missouri River and the Platte River, however, none have happened in California with Fremont's cottonwood. The study will provide new information for developing adaptive management strategies for creating SRA habitat and stabilizing cobble fields. This innovative pilot study investigating a methodology for establishing riparian plants on existing cobble fields left over from historic hydraulic and gravel mining will be applicable for restoration of cobble fields on other Central Valley streams (e.g., Yuba River, Tuolumne River, etc). Funding has been allotted through this proposal should CEQA/NEPA or other permitting be required for the work described above. The bays and terraces will be created and monitoring of seed germination will continue throughout the first year of the contract. Monitoring, data synthesis, and report preparation will be completed in year two of the project.
Deliverable: *Report with a Quantified Prescription for Cobble-Field Restoration and Management – July 2001*

Phase III - Develop a Consensus-Based Comprehensive Restoration Strategy and Plan for the Butte Creek Ecological Preserve

Scheduled Timeframe: January 2001 – June 2002

Task 1 – A comprehensive Restoration Strategy will be developed using the results of the cobble field revegetation pilot study, a Stream Evaluation Program being conducted by the California Department of Fish and Game (DFG), the in-progress Fluvial Geomorphology Study partnering CSU, Chico and Matt Kondolf, Ph.D., and a review of the property management plans already developed by DFG and CSU, Chico. All of the previous studies will provide important data and recommendations for restoration efforts. A restoration committee will be developed with individuals representing, CSU, Chico, M&T Ranch, Durham Mutual Water Company, County of Butte, California Department of Fish and Game, and other interested individual landowners. The cooperators listed have indicated their support of this project. Letters of support were sought earlier in the year when this project was submitted to a different funder, since then this project has been revised. The revisions are minor and do not affect the essence of what was originally envisioned, however a revised copy of this proposal will be submitted for their consideration.

This restoration committee will utilize results of these studies and emphasize ecosystem processes using natural self-sustaining methods to develop a restoration strategy that enhances aquatic species habitat, stabilizes streambanks, and provides for flood control measures. Ultimately, once the comprehensive restoration strategy is complete, the collaborating parties will seek to leverage funds from multiple sources for implementation of the restoration strategy. Phase III of this project will commence in year two. However, year one data related to the first two phases of the project will be shared with project collaborators during year one.
Deliverable: *Comprehensive Butte Creek Ecological Preserve Restoration Plan for the Entire Reach – September 2001*

Project Management Phase – **Managerial Oversight of Project**
Scheduled Timeframe: Length of Project

Task 1 – Throughout the life of the project there will be substantial administrative duties including, but not limited to, quarterly reporting, public outreach, attendance at related meetings, and general project management and coordination with the multiple collaborating entities.
Deliverable: Quarterly Reports, Final Report, and successful completion of project.

USFWS FY 2000 October 1, 1999 – September 30, 2000

Project Phase and Task	Direct Labor Hours	Direct Salaries and Benefits	Service Contracts	Materials and Acquisition Contracts	Miscellaneous and Other Direct Costs	Overhead Labor (general, admin and fee	Total Costs
Phase I	463hours	$10,074	0	0	$423	$3,406	$13,904
Phase II	435 hours	$10,450	$10,000	$	$599	$4,389	$26,971
Phase III	0	0	0	0	0	0	0
Project Management Phase	460 hours	$12,234	0	0	$1,950	$3,905	$18,089
Totals	972.5 hours	$34,411	$10,000		$2,972	$11,690	$59,084

****** $5,000 has been allocated to CEQA documentation if required

USFWS FY 2001 October 1, 2000 – September 30, 2001

Project Phase and Task	Direct Labor Hours	Direct Salaries and Benefits	Service Contracts	Materials and Acquisition Contracts	Miscellaneous and Other Direct Costs	Overhead Labor (general, admin and fee	Total Costs
Phase I	240 hours	$6,793.20	$5,000	$5,000	$280	$2,202.48	$19,275.68
Phase II	200 hours	$8,416	$6,000	$400	$360	$2,804.80	$17,980.80

Phase III	700 hours	$21,417	0	0	$2,600	$7,035	$31,052.00
Project Management Phase	312.5 hours	$8,848.50	0	0	$6,400	$2,789	$18,037.50
Totals	1452.5 hours	$45,474.70	$11,000.00	$5,400.00	$9,640.00	$14,831.28	$86,345.98

Quarterly Budget USFWS FY 2000
October 1, 1999 – September 30, 2000

Task	Quarterly Budget Oct – Dec 99	Quarterly Budget Jan – Mar 00	Quarterly Budget Apr – Jun 00	Quarterly Budget Jul – Sep 00	Total Budget
Phase I	$695.70	$5,555	$5,565	$2,087	$13,904
Phase II	$1,349	$10,788	$10,788	$4,045	$26,971.
Phase III	0	0	0	0	0
Project Management Phase	$1,855	$5,411	$5,411	$5,411	$18,089
Totals	$3,899	$21,755	$21,765	$11,543	$59,083

Quarterly Budget USFWS FY 2001
October 1, 2000 – September 30, 2001

Task	Quarterly Budget Oct – Dec 99	Quarterly Budget Jan – Mar 00	Quarterly Budget Apr – Jun 00	Quarterly Budget Jul – Sep 00	Total Budget
Phase I	$4,818.92	$4,818.92	$4,818.92	$4,818.92	$19,275.68
Phase II	$4,495.20	$4,495.20	$4,495.20	$4,495.20	$17,980.80
Phase III	$7,763.00	$7,763.00	$7,763.00	$7,763.00	$31,052.00
Project Management Phase	$4,509.37	$4,509.37	$4,509.38	$4,509.38	$18,037.50
Totals	$21,685.49	$21,586.49	$21,586.50	$21,586.50	$86,345.98